

BEIJING — ARIZONA COLOR (BAC) SKY SURVEY

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ABSTRACT. Observational astronomy can be roughly split into two categories of study: surveys, designed to detect and categorize objects, and detailed observations that provide physical insight into individual objects. The application of large format CCDs makes it possible to conduct surveys which yield quantitative information for large samples of objects.

In investigating possible observing strategies, we found that, to the best of our knowledge, two important strategies have not yet been employed in a large scale astronomical survey: a) to obtain the full visible spectral energy distribution (SED) from 3200 to 9000 Angstrom of all survey objects at a spectral resolution ($\delta\lambda/\lambda$) of about 0.05; b) to detect objects which are variable on timescales ranging from minutes to about one year. We realized that these two observing strategies would yield the highest scientific returns for all of our scientific fields of interest.

Our observational objective is to obtain the SED of every object down to well-defined brightness limits in about 450 square degrees of the sky, from 3200 to 9000 Angstroms. 14 intermediate-band filters of 250 - 300 Angstroms bandwidth ($\lambda/(\delta\lambda)$ is about 0.05) will be used to cover the full spectral region at constant ($\delta z/z$), a critical requirement for the QSO part of the survey. Filter width and the centre wavelength will be slightly modified, if necessary, to minimize contamination by strong night sky emission. These 14 filters form a very low resolution spectrophotometer.

Given the common and combined interests of the astronomers in the China-Arizona consortium, it was decided to survey the sky in three ways:

- 1) choose 150 fields centred on known QSOs. The QSOs will be a priori selected to cover the full range of redshift and optical properties;
- 2) choose 150 fields centered on relatively nearby spiral galaxies with apparent diameters $2' - 5'$, selected by clear a priori criteria;
- 3) choose 150 fields in random directions within the same objective observational constraints imposed on the QSO and galaxy fields.

In order to provide for adequate photometric standardization and classification of galactic stars, 50 standard star fields will be observed. All fields will be at a high galactic latitude region.

The dedicated instrument for the survey is the 60/90 cm f/3 Schmidt telescope of the Beijing

Astronomical Observatory with a Ford Aerospace 2048 x 2048 CCD.

The Science to be done with the survey will be the following:

- 1) find QSOs of all kinds with redshifts that range from $z = 1.7$ to 6;
- 2) study the large-scale distribution of QSOs in the Universe as a function of redshift;
- 3) determine the interrelationships among the structure, stellar populations and interstellar media of nearby spiral galaxies;
- 4) study the spatial distribution and spectral evolution of galaxies between the present day and a redshift of about 0.2 to 0.3;
- 5) determine the largest-scale topology of the Universe.

Comparable numbers of stars will be found as extragalactic objects, out of which separate studies of Galactic structure will be derived.

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